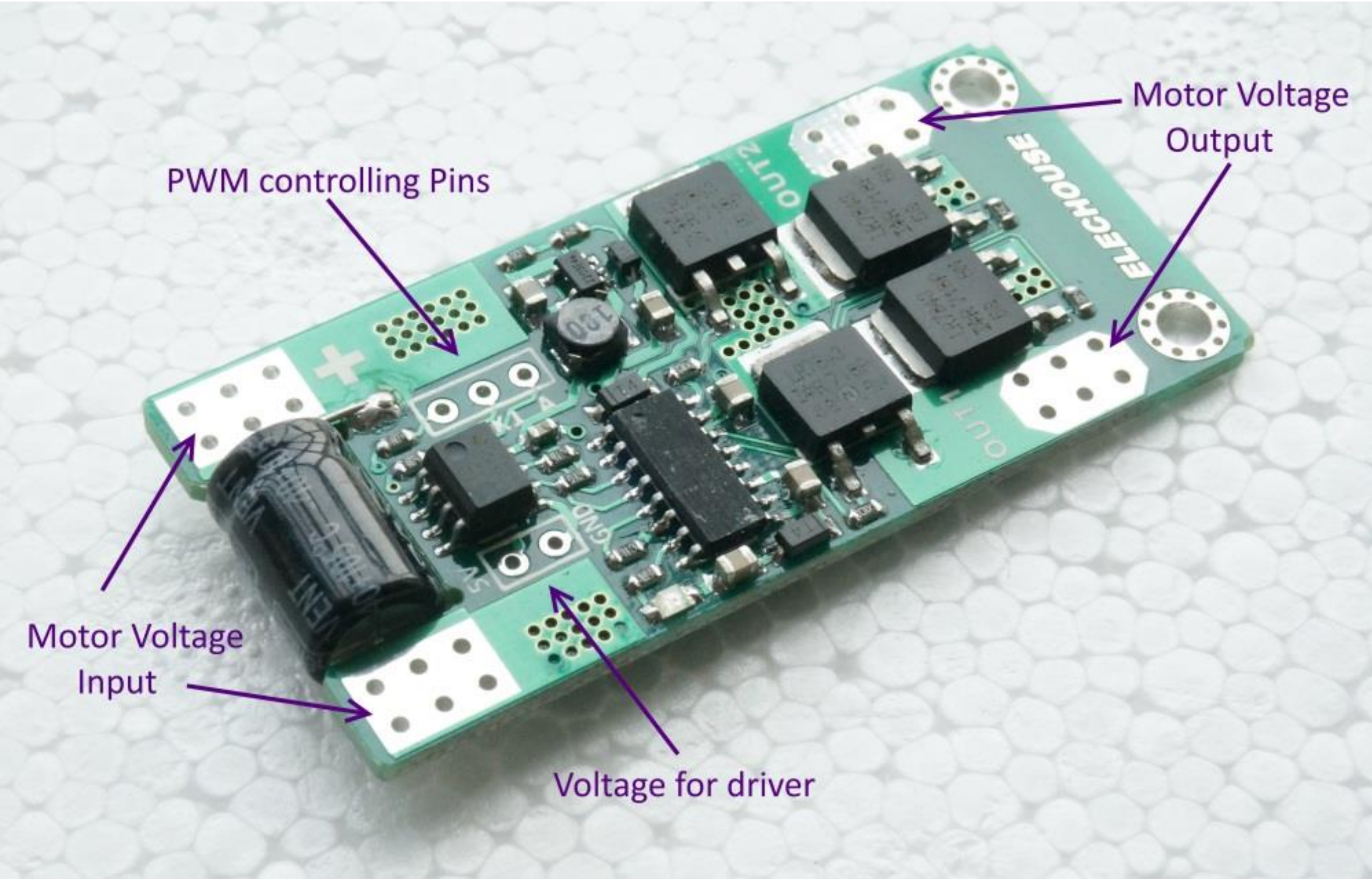
20A Single Driver Module

Isolated Version

Introduction



This single channel motor driver could control motor's speed and direction. Its on-board optical coupler isolates controlling signal and the motor signal. It could prevent the logic control unit (such as Arduino) from electronic interference from motor, which greatly enhances the stability and reliability of the logic control unit.
Its maximum stable current is 20A. Under 20A working current, the temperature rises about 40 Celsius degrees. The working peak current can reach 161A. Compared with other motor driver such as MC33886 or L298N, this driver is much powerful.
To expand the max current, users can freely stack 2 drivers together as one driver.

This module is a full-bridge driver which consists of four 0.003 ohms low-resistance MOSFET tubes. The motor drive module can operate at 0% -98% of the PWM pulse width, supporting frequency from 500Hz to 100KHz.

Features

- On-board optical coupler prevents micro-controller's controlling signals from electronic interference from motor, which greatly enhances system stability and reliability.
- Wide voltage range for motor: 0~28V.
- Max stable working current (w/o external heat sink): 20A
- External heat sink (optional) could improve the max stable working current.
- 2 or more drivers could be stacked together as one more powerful driver.

Electrical Parameters

PARAMETER	VALUE	NOTE
INPUT PWM SIGNAL LEVEL (FOR PWM1 AND PWM2)	2.8V ~ 5.5V	
INPUT PWM SIGNAL CURRENT	≤8mA@3.3V PWM ≤12mA @ 5V PWM	
INPUT CURRENT THROUGH PIN A	≤16mA@3.3V PWM ≤24mA @ 5V PWM	
SUPPLY VOLTAGE FOR DRIVER	2.3V ~ 5.5V	Typically 5V recommended
SUPPLY CURRENT	25mA ~ 100mA @ 5V	
POWER VOLTAGE FOR MOTOR	0 ~ 28V	
PWM DUTY RANGE	0%~98%	
WORKING CURRENT	Rising temperature under working current I = 10A, △T = 20 ℃ (no heat sink) I = 20A, △T = 45 ℃ (no heat sink) I = 30A, △T = 35 ℃ (natural cooling heat sink) I = 50A, △T = 45 ℃ (air cooling fans)	
PEAK WORKING CURRENT	160A	

Wiring diagram

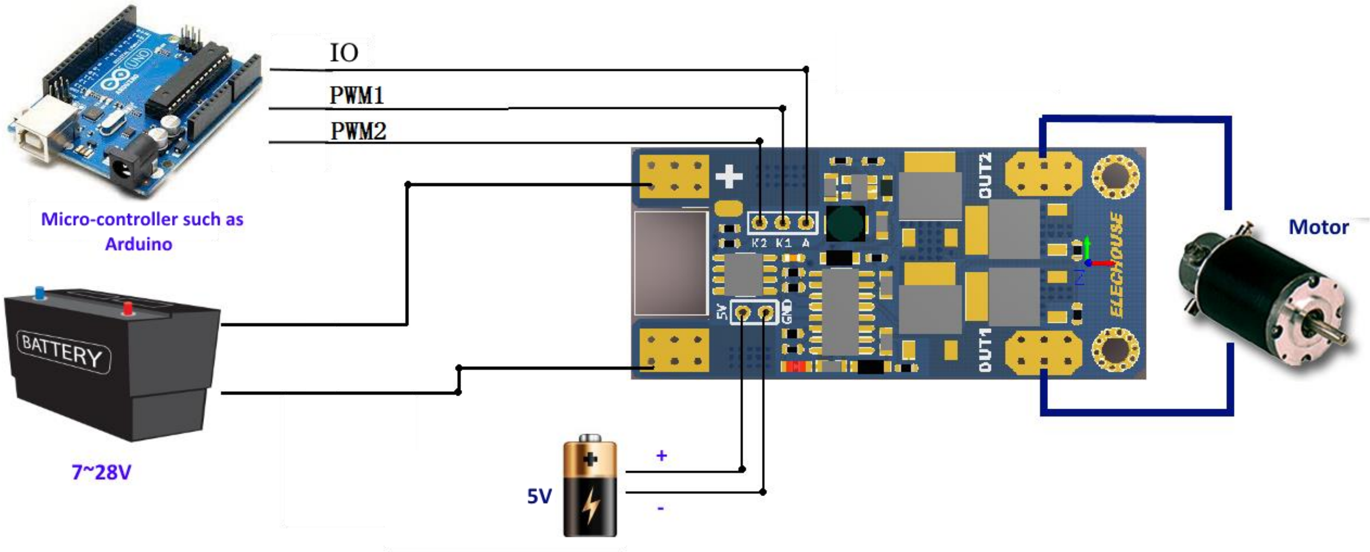
There are several ways to wire the board. We recommend the first 2 ways.

Isolated wiring A

In this diagram, your system needs 3 power sources:

- 5V for micro-controller
- 5V for driver

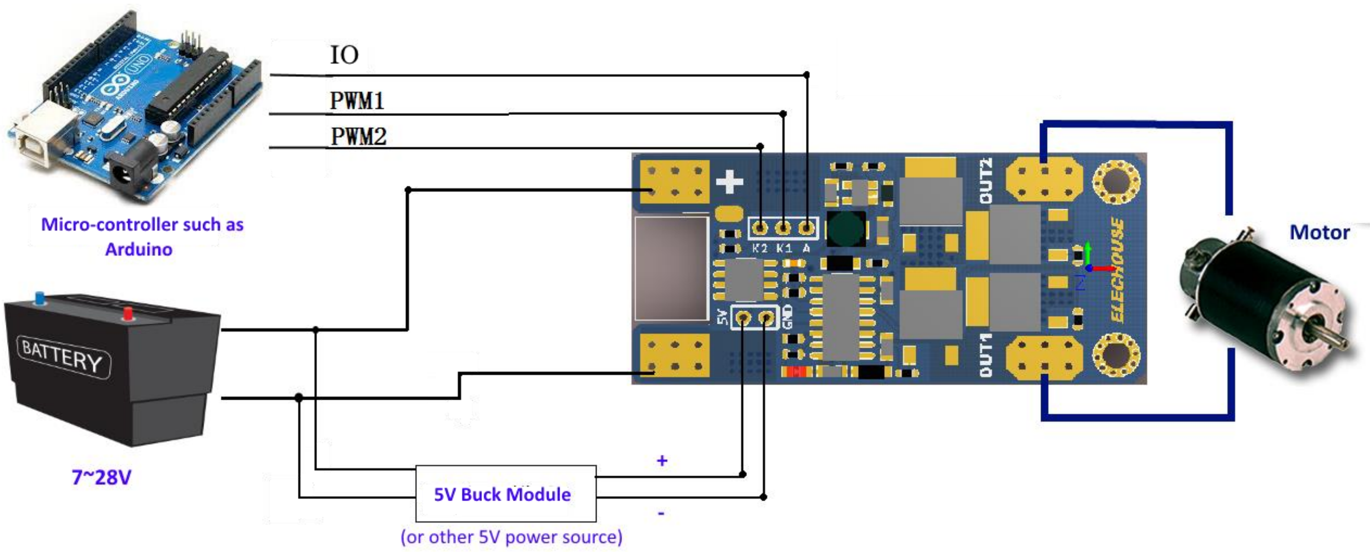
➢ 0~27V for motor



Isolated wiring B

In this diagram, your system needs 2 power sources and 1 DC buck module:

➢ 5V for micro-controller
➢ 0~27V for motor



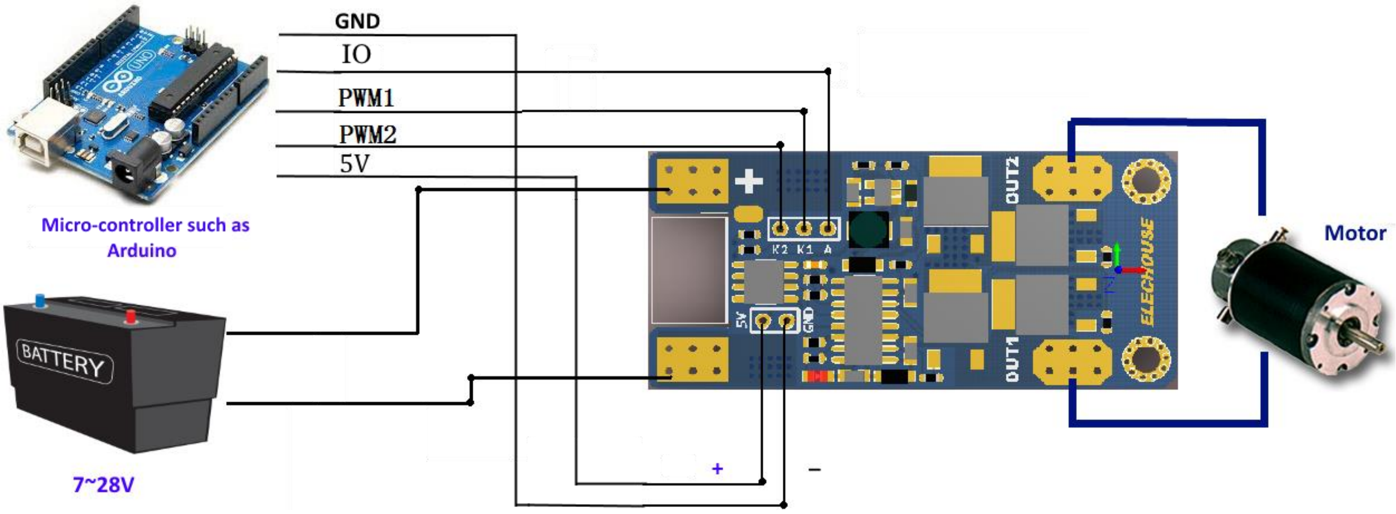
The 2 ways of wiring above could prevent interference.

The following 2 ways of wiring could work but fail to isolate the interference. If your micro-controller could work stably or your motor generates little electronic interference, this wiring could work.
In fact, our motor driver V1 has no optical coupler to isolate the interference. If you wires the board in the following ways, it works just like V1.

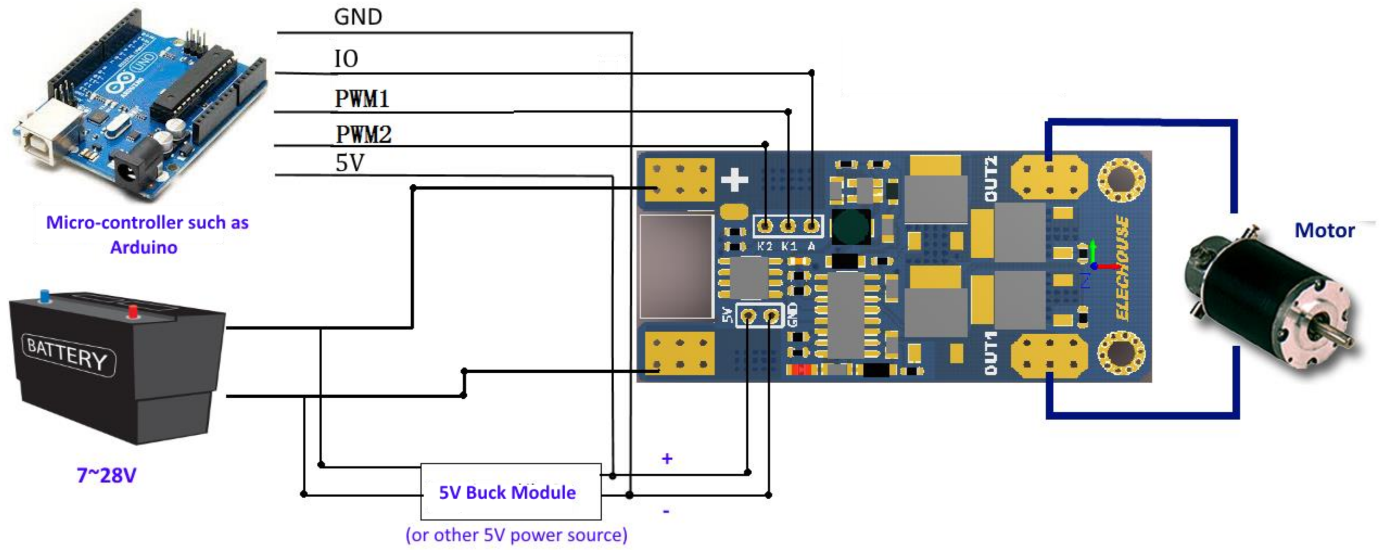
Common Wiring C

In this diagram, your system needs 2 power sources:

➢ 5V for micro-controller
➢ 0~27V for motor



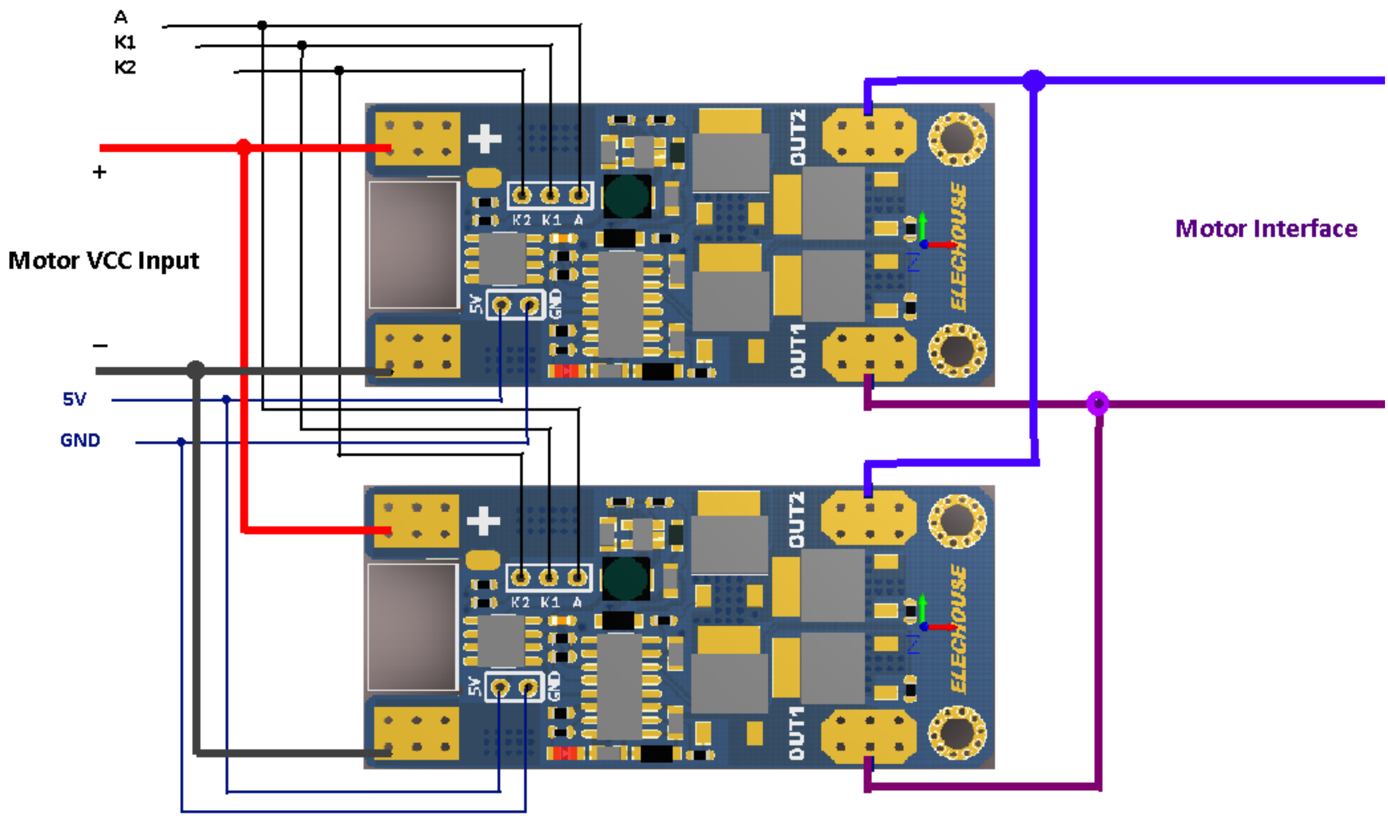
Common Wiring D

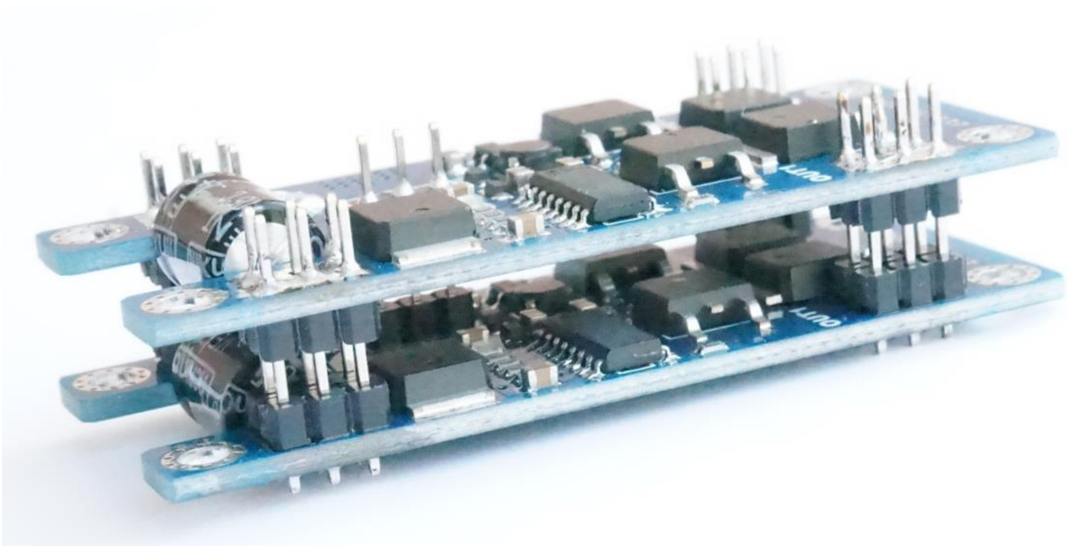


In this diagram, your system need only 1 power and 1 DC buck module:

- ➢ 0~27V for motor

Combine 2 to 1





Controlling Signal

Pin Definition

Pin	I/O	Description
+	Input	Power supply positive pin, recommend 0 ~ 28V. This pin is marked "+" on the board.
-	Input	Power supply negative pin. This pin is marked "-" at the back side on the board.

OUT1	Output	To one terminal of the motor
OUT2	Output	To another terminal of the motor
A	Input	Controlling circuit input, 3.3V~5.5V
K1	Input	PWM input pin If this pin doesn't connect to anything, it would be regarded as HIGH. Range: -0.3V ~ 12V. Identifying low voltage ≤ 1V, identifying high voltage ≥ 2.5V.
K2	Input	PWM input pin If this pin doesn't connect to anything, it would be regarded as HIGH. Range: -0.3V ~ 12V. Identifying low voltage ≤ 1V, identifying high voltage ≥ 2.5V.
5V	/	5V Voltage
GND	/	GND

Controlling Rule

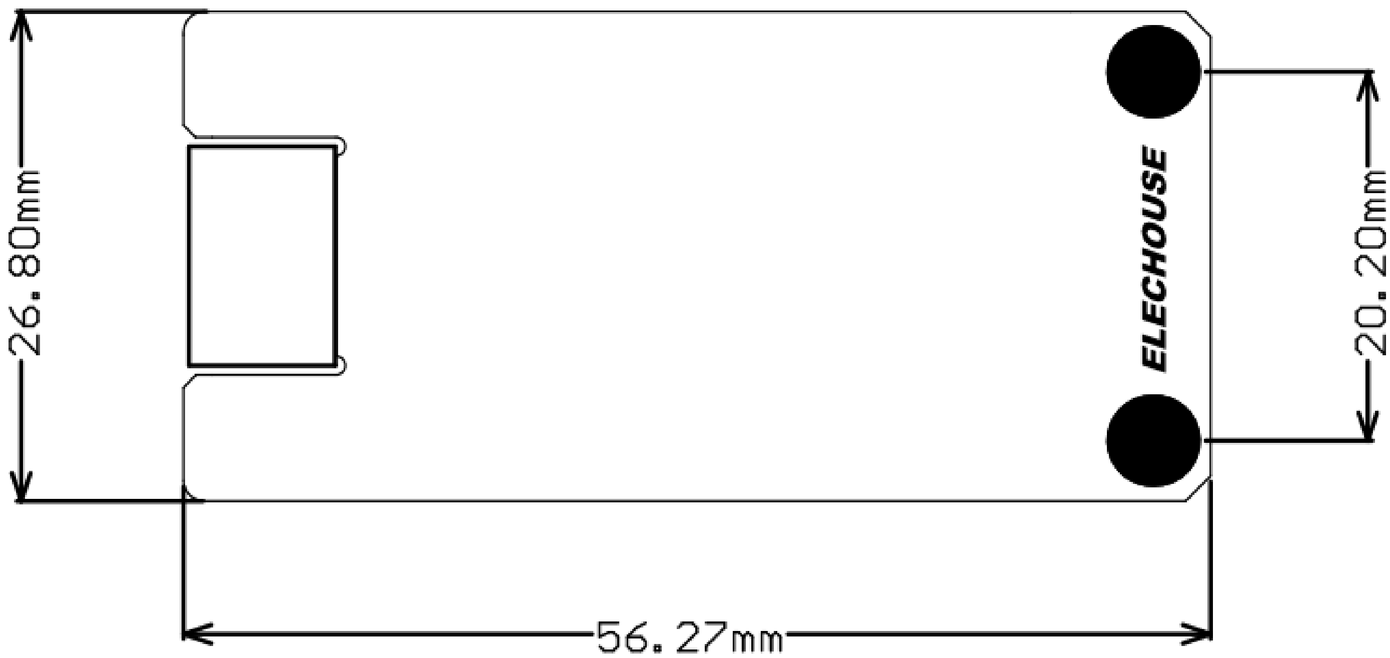
State	A	K1	K2	OUT1	OUT2
Forward Speeding	H	PWM	H	~PWM	L
Reverse Speeding	H	H	PWM	L	~PWM
Brake	H	H	H	L	L
Brake	L	X	X	L	L

NOTE:

There are 2 ways to brake:

- ✓ *Give A LOW level*
- ✓ *Give K1 and K2 HIGH level*

Dimension

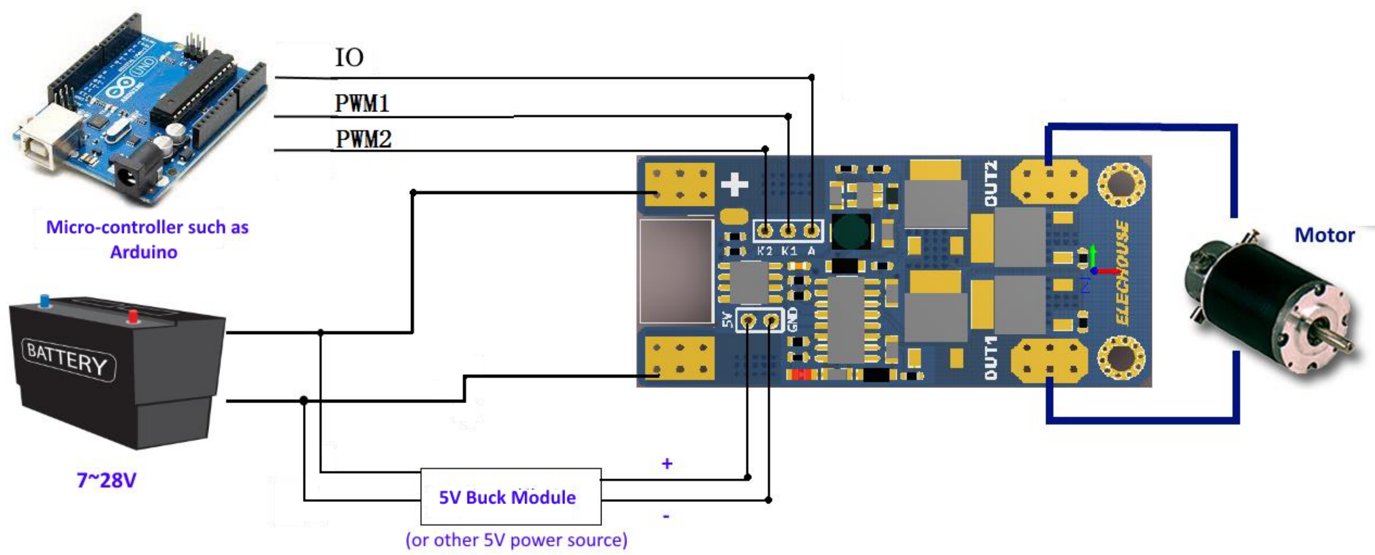


- PCB Dimensions: 56.27mm x 26.8mm
- Pin spacing on motor voltage pads: respectively 1400mil and 700mil. (hole spacing on pads is 100mil)
- Thickness: 8mm

Example with Arduino

We will give an example showing it work with Arduino.

Wiring



Arduino	Motor Driver
5V	A
P10	K1
P12	K2

Code

Arduino UNO: Click to download the code

Note: by default Arduino PWM frequency is 500HZ. For better performance, you could change PWM frequency. Please refer to those 2 pages: Secrets of Arduino PWM and PWM frequency of Arduino.

Disclaimer and Revisions

The information in this document may change without notice. Please visit www.elechouse.com for new information.

Revision History **Rev.**	**Date**	**Author**	**Description**
A	Jan 3rd, 2014	Wilson	Initial version
B	Mar 12^{th}, 2015	Wilson	Isolated Version Update